

Upper Mississippi River Nine-Foot Channel Project,
Lock and Dam No. 26
Alton, Illinois
Madison County, Illinois
St. Charles County, Missouri

HAER No. IL-31

HAER
ILL,
60-ALT,
3-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
U. S. Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENGINEERING RECORD

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Location: The site is located on the Mississippi River at Alton, Illinois, immediately upstream from the Missouri & Illinois Bridge & Belt Railway bridge and approximately 23 miles above St. Louis, Missouri, at river mile 202.9. The locks lie on the east side of the river, adjacent to Alton, Illinois. The movable dam extends westward from the river wall of the twin locks, approximately 1,724 feet to the abutment on the Missouri side of the river. Adjoining the abutment at an angle, an earthen dike extends nearly 900 feet to the embankment of the Missouri & Illinois Bridge & Belt Railway.

Date of Construction: 1934-1938

Architect/Engineer: U. S. Army Corps of Engineers

Builder: John Griffiths & Son Company, Chicago, Illinois

Present Owner: U. S. Government (St. Louis District, U.S. Army Corps of Engineers)

Present Use: River navigation and control

Significance: The Upper Mississippi River Nine-Foot Channel Project represents one of the largest and most ambitious river improvement projects ever constructed in the United States. The project's origins date to the 1920s and the efforts of Upper Midwest commercial interests to improve their access to markets. During the early years of the Great Depression, the project became transformed into a massive public works program intended to relieve local and regional unemployment.

The locks and dams that comprise the project constitute seminal developments in the technological history of American river navigation projects. The project pioneered the use of non-navigable movable dams in the United States. Designers and engineers from the U.S. Army Corps of Engineers committed themselves to a foreign technology, by their decision to incorporate roller gates into the majority of the project's dams and, more importantly, developed new and improved versions of the simpler and more reliable Tainter gate at such a rapid rate that, by the end of the 1930s, roller gates had become a passe' technology.

The successful completion of the Nine-Foot Channel Project transformed the Upper Mississippi River into an intra-continental canal, providing a fully navigable interior river system throughout the Midwest. The project significantly altered the environment of the Upper Mississippi, but it also served as an impetus for the improvement of drinking water and sewage disposal systems in towns and cities located along the river. Additionally, the project provided new recreational opportunities to the general public.

Historian: Patrick W. O'Bannon, July 1989

PART I. HISTORICAL INFORMATION

A. Physical History

1. Dates of Erection: 1934-1938
2. Architect-Engineer: U. S. Army Corps of Engineers
3. Original and Subsequent Owners: U. S. Government
4. Builders, Contractors, Suppliers
 - a. General Contractor -- lock construction: John Griffiths & Son Company, Chicago, Illinois; locks completed by Engineering Construction Company, Delaware
 - b. Subcontractors -- lock construction: American Bridge Company (structural steel and miscellaneous iron), LaCiede Steel Company (reinforcement steel), Chicago Wood Piling Company (wood piling), Inland Steel Company (permanent and cofferdam steel sheet piling), Westinghouse Electric & Manufacturing Company (concrete piles), Mississippi Lime Company (concrete aggregates), Century Electric Company (cement), Marquette Cement Manufacturing Company (cement), Alpha Portland Cement Company (cement), Chicago Tube & Iron Works (handrail), William F. Klemp Company (floor grating), S.C. Sachs Company (electrical conduit), D. O. James Manufacturing Company (speed reducers), Link-Belt Company (valve chains), Cutler-Hammer Company (brakes for Tainter valves), H. Knudson Company (painting).
 - c. General Contractor -- dam construction: Engineering Construction Company, Delaware
 - d. Subcontractors -- dam construction: American Bridge Company (structural steel and miscellaneous iron), Concrete Steel company (reinforcement steel), LaCiede Steel Company (reinforcement steel), Carnegie Steel Company (permanent and cofferdam steel sheet piling), Missouri Portland Cement Company (cement), Universal Atlas Cement Company (cement), Mississippi Lime Company (concrete aggregate), Collins Timber Company (wood piling), Ross Lumber Company (wood piling), Bolz Dredging Company (earthwork), Trucson Steel Company (doors and window sash), Vickery Construction Company (brickwork), Century Electric Company (machinery motors), Cutler-Hammer Company (machinery controls and brakes), Goodal Company (rubber seals), D. O. James Company (speed reducers), S. Morgan Smith Company (gate machinery), Link-Belt Company (gate chains), Beckman Painting Company (painting), General electric Company (gate heaters)

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5. Original Plans and Construction: U.S. Army Corps of Engineers

6. Alterations and Additions:

<u>Item</u>	<u>Year</u>
Over 800 cubic yards of grout pumped into voids beneath intermediate lock wall to correct boils along both sides of wall.	1939
Maintenance building constructed. No longer extant.	1940
Guard rails installed	1941
Drains in dam stilling basin capped to prevent loss of foundation sand through boiling	1941
Storage building erected in storage yard.	1943
Housings constructed for miter gate operating machinery.	1946
Housings constructed for Tainter valve machinery recesses	1948
Bulkhead recesses constructed in lock chambers	1951
Emergency rehabilitation of main lock lower miter gates and sill	1953
Main lock upper miter gate sill raised fifteen feet and forty-five-foot miter gates replaced by thirty-foot gates	1954
Seven- to nine-foot void below river wall at auxiliary lock lower miter gate sill filled with pea gravel and grout	1954
"Window" in sheet piling below dam repaired to halt uncontrolled flow of water	1954
Auxiliary lock upper miter gates rehabilitated	1955
Auxiliary lock lower miter gates replaced and sill rebuilt	1956
Shelters constructed on lock walls for lockmen	1958
Lower guide wall extension and terminal cell remodeled	1963
Comfort station constructed at West Alton Public Access Area	1963
Main lock lower miter gates reconstructed	1968
River wall concrete repairs - auxiliary lock	1969
Stabilization of river and intermediate walls	1970
Placement of rock berm to river side of river wall	1970
Electrical facilities cable rehabilitation. Cables run overhead	1970-1971
Water supply system for West Alton Public Access Area	1971
Mooring facilities constructed	1972
Electrical facilities rehabilitated	1973
Repairs to main lock lower approach	1976
Vent hole in lock	1977
Lower guide wall extension rehabilitation	1977
Dam emergency bulkheads and stop logs rehabilitated	1977
New terminal cell constructed at lower guide wall	1978
Culvert Tainter valve rehabilitation	1979
Repairs to dam stilling basin and apron	1980
Lower guide wall extension -- new steel pile dolphins and sheet pile cell repairs	1980
New locomotive crane	1980
Rehabilitation of main lock Tainter valves Nos. 1, 3, and 4	1981

B. Historical Context

Lock and Dam No. 26 was the first installation within the Corps of Engineers' St. Louis District designed and completed under the Upper Mississippi River Nine-Foot Channel Project. Construction began on the main lock in January 1934. The locks and dam were officially placed in operation in May 1938.

The installation is comprised of a main and auxiliary lock, located against the east bank of the river, a movable dam measuring 1,725 feet in length, a storage yard located at the Missouri abutment of the movable dam, and an earthen dike, nearly 900 feet in length, that extends from the Missouri abutment to the embankment of the Missouri & Illinois Bridge & Belt Railway.

Construction of the locks was greatly complicated by their location immediately upstream from the Missouri & Illinois Bridge & Belt Railway bridge and the Clark Highway bridge. It proved necessary to utilize the swing span of the railroad bridge to maintain river traffic throughout the construction period. This required incorporating a pier of both the railroad and the highway bridge into the intermediate wall of the locks, which determined the alignment of the locks, increased the length of the lower land wall by approximately 200 feet and the intermediate wall by approximately 550 feet, and added appreciably to the ultimate cost of the installation.

The main lock conforms to standard specifications for the Upper Mississippi River Nine-Foot Channel Project. The lock chamber measures 110 feet in width and 600 feet in length. The auxiliary lock chamber measures 110 feet in width and 360 feet in length. Both lock chambers have concrete floors with reinforced concrete struts that provide additional support for the lock walls. The lock chambers are flooded and emptied by means of longitudinal culverts located in the lock walls. Eight electrically-operated Tainter valves, located in the lock walls, control the flow of water in the culverts.

The movable portion of the dam consists of three roller gates, each measuring 80 feet wide and 25 feet tall, located in the center of the structure and flanked on either side by 15 Tainter gates, each measuring 45 feet wide and 30 feet tall. Both the roller and Tainter gates are raised and lowered by individual motor-driven gear reduction units mounted on the roller gate piers and service bridge spans, respectively. The dam piers are surmounted by a steel deck girder service bridge that extends the entire length of the dam and 154 feet onto the Missouri abutment. A locomotive crane is mounted on the bridge crane rails.

PART II. TECHNOLOGICAL INFORMATION -- LOCK

A. General Statement:

1. Architectural character: Standardized Ohio-Mississippi lock design. Drawing M-L 26 20/1.
2. Condition of fabric: Fair to poor.

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B. Description of General Layout and Principal Elements:

1. Overall dimensions: Main Lock -- 110 feet by 600 feet. Auxiliary lock -- 110 feet by 360 feet. Drawing M-L 26 20/1.
2. Foundations: Wood, concrete, steel sheet piling in sand.
3. Walls: Monolithic reinforced concrete with steel wall armor. Drawing M-L 27 20/1A, M-L 26 20/1.
4. Structural system: Monolithic reinforced concrete.
5. Bullnoses: Concrete bullnoses with steel wall armor at each end of intermediate wall.
6. Upper and lower guide walls: Monolithic reinforced concrete construction, extensions to land wall, located above and below the lock chamber to assist in guiding traffic into the chamber.

C. Mechanical Equipment:

1. Lockmen's shelters: Operating control for lock gates and Tainter valves housed in small buildings on lock walls.
2. Tainter valves: Eight electrically-operated, cable-driven steel Tainter valves located in upper and lower ends of lock walls. Drawings M-L 26 20/1, M-L 26 25/1, M-L 26 28/1.
3. Lock Gates: Four two-leaf Miter gates balanced on stainless steel pintels. Electrically-operated by means of steel sector gears and struts. Motor assemblies housed in machinery pits located in lock walls adjacent to each gate leaf. Oak timber fenders on gate faces. The main lock upper gates are 30 feet tall. These gates, erected in 1954, in association with a project that raise the height of the gate sill 15 feet, replaced the original 45-foot tall gates. The main lock lower gates, erected in 1968, are 45 feet tall. The auxiliary lock gates are 45 feet tall. Drawings M-L 26 20/1, M-L 26 22/1, M-L 26 21/17.
4. Lighting: Various free-standing single- and double-head lighting standards. Heads replaced ca. 1980.
5. Plumbing: Lock chambers are watered by means of longitudinal culverts located in base of the lock walls. The main lock culverts are square in section, measuring 12 feet 6 inches by 12 feet 6 inches. A segment of each main lock culvert is circular in section, with a diameter of 14 feet 6 inches. The auxiliary lock culverts are square in section, measuring 10 feet by 10 feet. A segment of each auxiliary lock culvert is circular in section, with a diameter of 11 feet 6 inches. Tainter valves (described above) control the flow of water in the culverts. Drawings M-L 26 20/1, M-L 26 25/1, M-L 26 28/1.
6. Tow Haulage Unit: Motorized winch assembly used to assist movement of barges through the lock chamber.

PART III. TECHNOLOGICAL INFORMATION -- LOW WATER DAM

A. General Statement:

1. Architectural character: Type 2b roller gate piers. Operating houses have slit window openings with multiple-light industrial sash, flat roofs, and virtually no architectural embellishment. Drawings M-L 26 40/1, M-L 26 40/2, M-L 26 40/3.
2. Condition of fabric: Fair

B. Description of Exterior:

1. Overall dimensions: 1,725 feet in length. Drawing M-L 26 40/1.
2. Foundations: Wood, concrete, and steel sheet piling in sand.
3. Operating house walls and piers/Tainter gate piers: Monolithic reinforced concrete. Drawings M-L 26 40/1, M-L 26 40/2, M-L 26 40/3.
4. Structural system: Monolithic reinforced concrete construction incorporating piers, gate sills, and dam apron. Drawings M-L 26 40/1, M-L 26 40/2, M-L 26 40/3, M-L 26 40/10.
5. Operating house openings: One doorway and eleven slit windows, each with six-light industrial metal sash, for each of the three roller gate operating houses. Drawings M-L 26 40/1, M-L 26 40/2.
 - a. Doorways and doors: 3
 - b. Windows: 33
6. Operating house roofs:
 - a. Shape, covering: Sloped roof with tar and gravel built-up roofing.
7. Storage house openings: Pier No. 19 storage house has one doorway and eleven slit windows, each with six-light industrial mesh sash. Storage house and stair tower located within Pier No. 37 has two doorways and seven slit windows, each with six-light industrial metal sash. Drawing M-L 26 40/1, M-L 26 40/2.
 - a. Doorways and doors: 3
 - b. Windows: 18
8. Storage house roofs:
 - a. Shape, covering: Sloped roof with tar and gravel built-up roofing.

9. Service bridge:

- a. Shape: Deck girder. Drawing M-L 26 40/1.
- b. Materials: Structural steel

C. Description of General Layout and Principal Elements:

- 1. Access plans: Access to dam, from lock, provided by an open reinforced concrete stairway attached to the Central Control Station and Pier No. 1. Access from storage yard provided by stair tower contained within Pier No. 37. Drawing M-L 26 40/1.
- 2. Stairways: Structural steel/poured concrete.
- 3. Flooring: Steel/reinforced concrete.
- 4. Wall and ceiling finish: Reinforced concrete in Pier No. 37.
- 5. Hardware: Brass

D. Mechanical Equipment:

- 1. Movable gates -- roller type: Three submersible units, each measuring 80 feet wide by 25 feet tall. Individual electrically-operated chain hoists, with machinery housed in pier-top operating houses, raise and lower the gates on toothed inclined racks. Drawings M-L 26 40/3, M-L 26 47/1, M-L 26 54/1.
- 2. Movable gates -- Tainter type: Thirty submersible units, each measuring 40 feet wide by 30 feet tall. Individual gates operated by chain hoists driven by individual electric motors located beneath service bridge spans. Drawings M-L 26 40/1, M-L 26 40/2, M-L 26 48/1, M-L 26 55/1.
- 3. Lighting: Some fixtures extant from ca. 1940 installation. Others replaced and/or rewired.

E. Other Elements:

- 1. Earth dike: Linear, submersible earth dike projects downstream at an angle from the Missouri abutment, extending approximately 900 feet to the embankment of the Missouri & Illinois Bridge & Belt Railway. Crest of dike is paved with asphalt and comprised of steel sheet pile cells with stone and earth fill. Drawing M-L 26 40/1.
- 2. Roller and Tainter gate emergency bulkheads: Temporary blocking units of structural steel girder construction used to block gate openings during emergencies or for repairs.
- 3. Emergency bulkhead cars/tracks: Flatcars and tracks designed to facilitate handling and storage of temporary emergency bulkheads in storage yard.

4. Flatcar assembly: Flatcar associated with locomotive crane atop service bridge.
5. Locomotive crane: Rail-mounted gasoline-powered crane, replaced ca. 1980. Located atop service bridge and used to handle heavy equipment and emergency bulkheads. Drawings M-L 26 40/1, M-L 26 40/2, M-L 26 40/3.
6. Storage yard: Located at east abutment of movable dam and incorporating Pier Nos. 34-37. Paved yard area measures 154 feet by 92 feet and contains four sets of tracks for storage yard trucks, a metal storage shed, and various spare parts, including the temporary emergency bulkheads. Drawings M-L 26 40/1, M-L 26 53/8.
7. Boat Launch: Electrically-operated davits located on intermediate wall.

PART IV. TECHNOLOGICAL INFORMATION -- ESPLANADE AREA

A. Description of Esplanade -- General Layout

1. Design character: Standardized park/service area component. Originally designed to accommodate various service-related functions. Major site alterations include construction of West Alton Public Access Area on Missouri shore.
2. Historic landscape design: Based on standardized designs.

B. Condition of Site and Structures: Altered

1. Central control station -- exterior: Flat roof with parapet. Buff brick walls with precast stone trim. Metal bay window addition at north end of east facade. Drawings M-L 26 70/1, M-L 26 70/12, M-L 26 70/13.
 - a. First floor - interior: Contains control room, with switchboard, offices, toilet room, stairway access to loft and basement. Drawings M-L 26 70/12, M-L 26 70/13.
 - b. Basement -- interior: Single room used for storage. Drawings M-L 26 70/12, M-L 26 70/13.
2. Outbuildings: Various service buildings and sheds erected over time. None have particular significance or contribute to the character of the site.
3. Observation deck: Raised observation deck located on esplanade.

PART V. SOURCES OF INFORMATION

- A. Original architectural drawings: Construction drawings, Mississippi River Lock & Dam No. 27, half-size copies on file at St. Louis District Office. Additional copies, as well as additional assorted drawings, are on file at the site.

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- B. Historic views: Construction photographs -- notebooks and files located at the site and at the St. Louis District Office.
- C. Interviews: Personnel, Lock and Dam No. 26.
- D. Bibliography:
 - 1. Primary and unpublished sources: final Reports Lock No. 26 and Dam No. 26, on file at the St. Louis District Office. Assorted files and records held at the site and at the St. Louis District Office. See bibliography to HAER No. MO-50, Narrative History.
- E. Likely sources not yet investigated: National Archives, Record Group 77, Kansas City, Missouri. The holdings for the St. Louis District are presently unprocessed. A preliminary investigation of more than 50 boxes of material failed to yield any significant information on the Nine-Foot Channel Project. However, the processed records will be much easier to use and may provide additional data.
- F. Supplemental Material: Aerial Photographs, U.S. Army Corps of Engineers, St. Louis District.

LOCK AND DAM NOS. 24 THROUGH 27 -- INDIVIDUAL SIGNIFICANCE AND INVENTORIES

This report is part of the documentation that outlines the specific technological component of each lock and dam complex, with particular emphasis upon significant and unique engineering elements. Additions and alterations to the various components comprising the individual complexes are also described in this documentation. The principal sources for information pertaining to these additions and alterations are the engineering drawings prepared for individual projects and the detailed repair and maintenance records held at each site. These sources do not comprehensively document the myriad changes, many of a decidedly superficial nature, made to each complex since its construction. Nevertheless, they constitute the only available record of these changes.

Dates for the construction of each complex are given from the onset of work to the completion of the complex and do not necessarily reflect the construction dates for any single element of the installation. Final construction reports survive for Lock and Dam No. 26, Lock No. 25, and Lock No. 24. These reports, held either at the individual sites or at the St. Louis District Office of the Corps of Engineers, concentrate almost exclusively on the actual construction process. The final construction reports include comprehensive lists of contractors and material suppliers, but contain only limited information pertaining to design, project administration, politics, and environmental issues.

Dimensions for the movable gate sections have been rounded, in accordance with common contemporary practice. For example, roller gates that measure 88 feet 10-1/2 inches in length are identified in construction drawings, completion reports, photographs, and this report, as 80-foot gates. Therefore, all gate measurements should be considered approximate rather than absolute.

Users of this documentation should note that, although many of the complexes appear identical, some architectural and engineering components vary significantly between complexes. This variation is most obvious in the disparity between the appearance of the three installations, Lock and Dam Nos. 24-26, constructed during the 1930s, with Lock and Dam Nos. 26R and 27, constructed after World War II. However, there are subtle variations in the design of gate piers, gates, control stations, and other elements at each of the three 1930s installations. These variations largely reflect improvements in engineering practice that permitted the elimination of structurally unnecessary material. The open design of the Tainter gate piers at Dam No. 24, as contrasted with the more massive, monolithic design at the earlier Dam No. 26, provides perhaps the most obvious example of this type of variation. A fuller discussion of the architectural and engineering evolution of the St. Louis District installations is included within the narrative history portion of this documentation.